

Pedagogy and Practice: Teaching and Learning in Secondary Schools

Unit 15: Using ICT to enhance learning

**Senior leaders,
subject leaders
and teachers in
secondary schools**

Status: Recommended

Date of issue: 09-2004

Ref: DfES 0438-2004 G



How to use this study guide

This study unit offers some practical strategies that teachers use to enhance learning through the use of ICT. The techniques suggested are tried and tested; they draw both on academic research and the experience of practising teachers.

By working through this guide you can build your teaching repertoire step by step, starting with strategies that are easy to implement and moving on to those that will help pupils develop their skills still further. The unit contains 'reflections', to help you reflect on an idea or on your own practice, as well as practical tips and tasks to help you consider advice or try out strategies in your classroom. There are case studies to exemplify particular points, a summary of the research and some suggestions for 'next steps' and further reading. The final page invites you to reflect on the material and to set your personal targets for the future.

You can work through this unit in a number of ways:

- Start small; choose one class to work with. Ask another teacher to help by talking through what you intend to do and to act as a mentor.
- Work with another teacher or group of teachers who teach the same class. Work together on developing the use of ICT to enhance learning. After three weeks compare notes. Discuss which strategies are the most effective and why.
- Find someone to pair up with and team-teach. Design the tasks together and divide the role of teacher in the lesson between you.
- Work with a small group of teacher-researchers within your school. Use the guide to help you focus your work as a professional learning community.
- Identify sections of the unit that are particularly relevant to you and focus on those.

There is space in this study guide for you to write notes and responses to some of the questions, but you may also find it helpful to keep a notebook handy. For some tasks, you might want to make an audio recording or video of yourself in action so you can review your work more easily. You could add this, along with any other notes and planning that you do as part of your work on this unit, to your CPD portfolio.

The evidence of work you gather in your portfolio could count as points towards accreditation of an MA, or could support your application for membership of a professional body, such as the General Teaching Council of England (GTCE). It could also be used to support an application to reach threshold or Advanced Skills Teacher status.

Using ICT to enhance learning

Contents

	Introduction	1
1	How does ICT support teaching and learning?	2
2	ICT supporting teaching: administration, planning and preparation	6
3	ICT supporting teaching: pedagogical impact	7
4	Classroom organisation	11
5	Using ICT to enhance subject teaching	13
6	Using classroom support staff effectively	16
7	Building capacity in school	17
8	Continuing to develop your professional capability	19
	Summary of research	20
	Next steps	22
	Setting future targets	23

Introduction

ICT capability is about having the technical and cognitive proficiency to access appropriately, to use, develop, create and communicate information using technological tools. Learners demonstrate this capability by purposefully applying technology to solve problems, analyse and exchange information, develop ideas, create models and control devices. They are discriminating in their use of information and ICT tools, and systematic in reviewing and evaluating the contribution ICT can make to their work as it progresses.

ICT capability is much broader than a set of technical competences in software applications although, clearly, these are important. ICT capability involves the appropriate selection, use and evaluation of ICT. In essence, pupils need to know *what* aspects of ICT are available to them, *when* to use it and *why* it is appropriate for the task.

For example, when creating a presentation, ICT capability involves the selection of appropriate software, consideration of fitness for purpose and matching content and style to a given audience. It is important that lessons are not software- or technology-driven but focused on clear teaching and learning objectives where ICT is used as a vehicle to support achievement of those objectives.

Common issues

The past five years have seen a slow but steady improvement in pupils' achievements in ICT capability, the quality of teaching, and the leadership and management of ICT ... The complementary use of ICT across subjects, however, has been slow to develop and is uneven across schools and subjects ...

The effective balance between the teaching of ICT skills, knowledge and understanding on the one hand and the application of these as part of learning across subjects on the other hand remains a difficult and elusive goal for the majority of schools.

Information and communication technology in secondary schools: Ofsted subject reports 2002–03

Resolving the issues

Enhancing teaching and learning using ICT works best when pupils are taught ICT capability in discrete lessons, and when teachers of other subjects enable pupils to apply that ICT capability, using it to enhance learning in the subject. It is important to recognise that pupils will bring with them a range of experience from their discrete lessons in ICT. They will have capability that can be both developed and applied in other lessons across the curriculum. As a subject teacher, you will need to be able to decide when to use ICT in your lessons.

Task 1

ICT in your subject

20 minutes

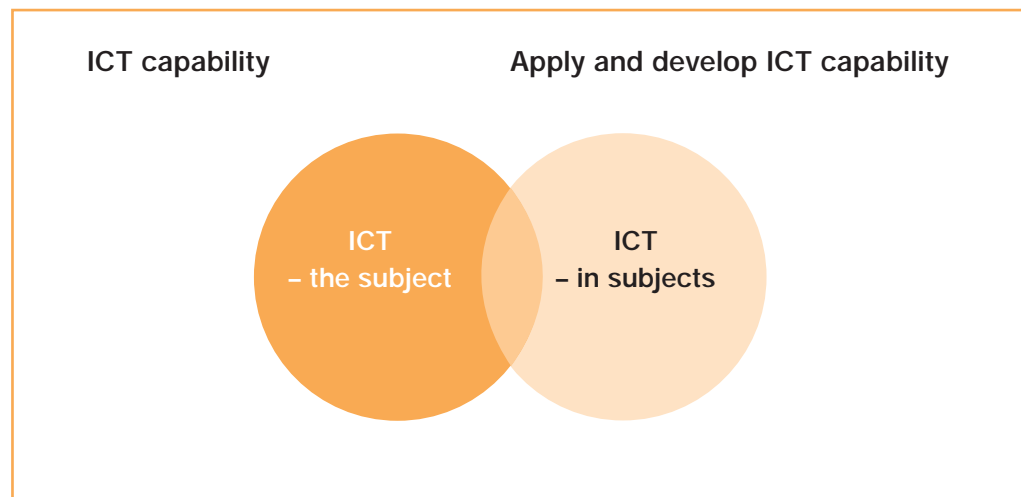
Select the scheme of work for one of the classes you teach.

Where is ICT being used? Identify where pupils are using ICT and where teachers are using ICT.

1 How does ICT support teaching and learning?

Pupils' ability to apply their ICT capability across the curriculum is largely dependent on the effective teaching and learning of ICT in the first place. Pupils' use of ICT in other subjects may be ineffective if they do not already have an appropriate level and understanding of ICT capability. This may result in a lack of progress in both ICT and the subject area. For example, asking pupils to produce a presentation in a given subject will be unproductive if they have little experience of using the software or understanding of how to create meaning and impact for a given audience. Pupils who try to learn new areas of ICT at the same time as new subject content will often fail in both endeavours.

It is crucial that pupils are taught the appropriate ICT capability before applying it in other subjects. The relationship between 'ICT – the subject' and 'ICT – in subjects' can therefore be viewed as interactive and mutually supportive, as shown in the diagram below.



Purposeful and appropriate application of ICT in subjects offers pupils opportunities to:

- use their ICT capability to assist and progress their learning in subjects;
- engage in higher-order thinking skills, for example by using ICT to undertake detailed analysis when modelling data;
- demonstrate, apply and reinforce their understanding of ICT capability within a range of subject contexts. The transferability of ICT capability is an important aspect of progression in pupils' knowledge, skills and understanding.

It is important to recognise that pupils using ICT effectively in subjects may not always be applying high levels of ICT capability. For example, using a wordprocessor to draft and re-draft text is a valid and powerful activity in a range of subjects; using software to support learning in MFL or using a learning support program in mathematics or a bespoke program designed to aid learning in science can be significant in helping pupils to make progress. In all such cases, ICT fulfils a legitimate function if using it moves learning in the subject forward, but it may make little contribution to developing the ICT capability taught in ICT lessons.

As pupils become more confident and proficient in using ICT, there will be opportunities to apply and develop higher ICT capability in subjects, for example producing web pages for a given purpose and audience, manipulating data to prove a hypothesis, or incorporating sound and video into a presentation to add meaning and impact. It is important to reiterate that, whatever the level of ICT capability applied, it must add value to the teaching and learning in the subject.

Although the *Framework for teaching ICT capability*, Ref. DfES 0321/2002 recommends that schools allocate discrete ICT teaching time in all years at Key Stage 3, it will be for schools to decide which is the most effective model. There may be some opportunities for aspects of ICT capability to be taught in a different subject area and then also applied in an appropriate context. For example, the control elements of the National Curriculum for ICT could be taught within design technology. However, teaching subject objectives and ICT objectives at the same time can be problematic, and teachers should be aware of the potential for the lesson to lose sight of the ICT objectives. Progress in the teaching and learning of a particular subject can also be disrupted by the time taken to teach the required ICT component from scratch.

Task 2

National Curriculum requirements

40 minutes

Does the use of ICT in your department reflect the National Curriculum requirements for your subject?

Identify any explicit references to the use of ICT in your own National Curriculum subject orders and ensure that these areas are already being covered in your scheme of work.

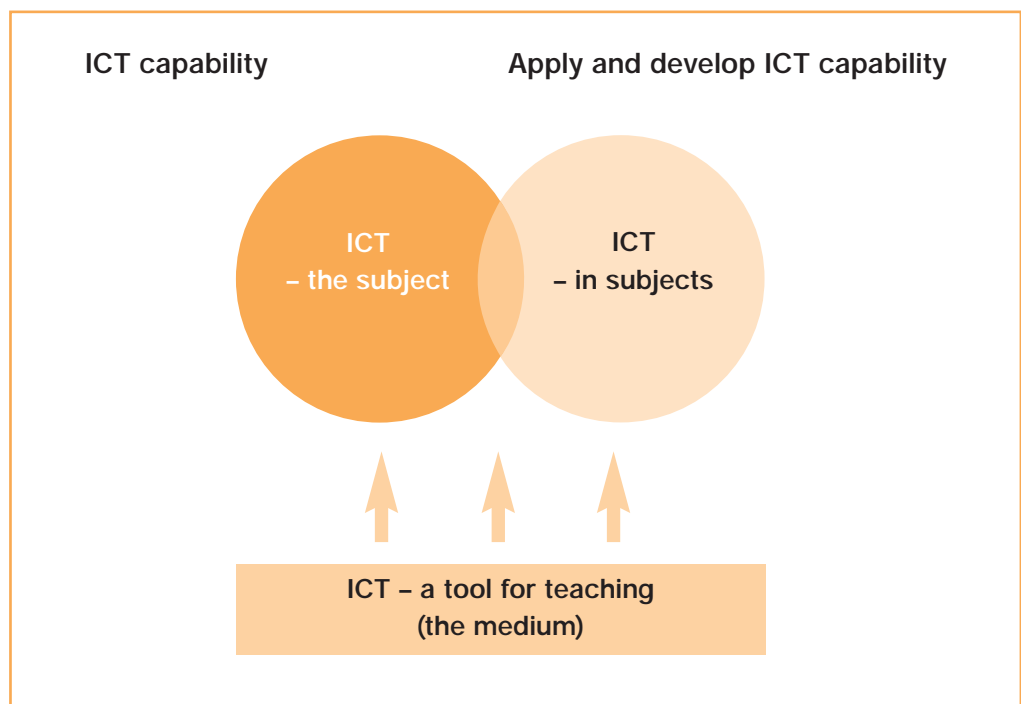
How do you ensure that you are dealing with the explicit references to ICT in your subject?

How do you monitor, review and evaluate the ICT experiences of all pupils across all classes that you are teaching?

So far we have reviewed the use of ICT as a learning tool for pupils and have acknowledged how pupils who are confident and proficient in ICT can bring with them opportunities for extending their learning as they use their ICT in other subjects in the school curriculum.

However, existing and emerging ICT *teaching* tools provide further opportunities to enhance subjects and add value to teaching and learning. For example, the use of interactive whiteboards, video projection units, microscopes connected to computers, prepared spreadsheets to capture and model data, CD-ROMs, presentations with video and carefully selected resources from the Internet all provide examples of how ICT can be embedded into subject teaching.

The diagram on page 3, showing ICT across the curriculum, can therefore be extended to include ICT as a tool or medium for teaching. Clearly, elements of the model will overlap and impinge on each other. When thinking about how ICT enhances teaching and learning, the challenge is to make the most purposeful use of the available resources across all teaching and learning. Opportunities to embed ICT in subject teaching need to be exploited, as appropriate.



Your use of ICT may involve little or no use of ICT by pupils and, consequently, may do little to apply and develop their ICT capability. However, use of ICT as a medium of teaching can enhance and stimulate the learning experiences of pupils and contribute to the achievement of subject objectives. It is important to recognise the different contributions that ICT can make to teaching and learning and to acknowledge the importance of each.

Task 3

Identifying how ICT is taught in your school

20 minutes

How is the teaching of the ICT National Curriculum organised in your school?

Identify the aspects of ICT that pupils have been taught in ICT lessons during Years 7, 8 and 9.

What ICT capability, through taught ICT lessons, can you reasonably expect pupils to be bringing to your subject lessons in each term?

2 ICT supporting teaching: administration, planning and preparation

ICT can reduce teachers' workloads. It has a role to play in reducing the time teachers spend in planning and preparing for teaching and learning activities.

Task 4

Enhancing planning and preparation with ICT 40 minutes

The table below describes ways in which ICT has been applied, by teachers, to plan and prepare for teaching.

Read through the table. Make a note if you have been able to use this aspect of ICT. Identify, in discussion with your mentor or coach, if you need further training and support to apply some aspects of ICT in your planning and preparation. Is there anything that you do that is not included here?

Uses of ICT	My use?	What sort of training will I need?
Wordprocessing templates, stored centrally, make it easier and quicker to write lesson plans and schemes of work		
Web-based assignments reduce time spent on marking		
Recording pupils' assessment data on spreadsheets makes producing reports and setting attainment targets much easier		
It's easier to share resources, expertise and advice through a school or LEA intranet or teachernet.gov.uk		
There is less duplication of effort in preparing lesson plans, worksheets and reports when they are shared on the school intranet		
Use of an interactive whiteboard and the preparation of shared resources can save time, as can emailing pupil homeworks		
Video conferencing between schools can support pupil and teacher learning		

Read through the [summary of research](#) on pages 20–21, and look at the research section of Becta's website: www.becta.org.uk/research/index.cfm
Identify how ICT can support your planning and preparation in:

- collecting, storing and using data;
- communication;
- increasing non-contact time;
- issues affecting workload reduction.

Task 5

Resource planning

30 minutes

Use the Internet to research curriculum-specific websites and resources for teaching and learning appropriate to the classes that you teach.

Discuss your findings with a colleague. How useful are they? What opportunities do you have to apply some of your findings?

3 ICT supporting teaching: pedagogical impact

ICT – in subjects

Successful implementation of the ICT strand of the Key Stage 3 National Strategy will give pupils a sound level of ICT capability and the transferable skills to build upon in their learning of other subjects. This has implications for teachers across all subjects in the curriculum.

Pupils will come to subject lessons with expectations about how they might apply ICT to move their own learning forward. Subject teachers will not need to teach ICT capability, but can exploit new opportunities for pupils to apply and develop the capability that they have, to enhance their learning in the subject. Consequently, the focus of the lesson remains firmly rooted in the subject being taught.

There are implications for subject teachers, in that they will need a good understanding of the breadth of ICT capability that pupils have been taught and will be bringing to their lesson. Teachers will also need to know which parts of ICT capability offer significant opportunities for teaching and learning in their subject and how they can be incorporated into existing schemes of work. The use of ICT needs to be purposeful and to add value to the teaching and learning of the subject and should not be seen simply as a 'bolt-on'. It needs to be carefully integrated into subject lessons, with a clear rationale for its use.

Whether you choose to use ICT or not in a subject lesson to support learning is an important decision. In general the use of ICT is helpful when:

- you could not do a task otherwise (e.g. demonstrate the nature of alternating current by monitoring a fluorescent tube);
- it enables you to do a task more efficiently (e.g. search for information, do an experiment in one-third of the time);
- it motivates pupils to learn.

ICT and pedagogy

Constructing meaning

There are many pedagogical models that can be applied in the ICT classroom. Increasingly, researchers and educators are linking constructivism, technology and learning. At the same time, numerous researchers and educators are busy designing what they refer to as constructivist learning environments.

Central to constructivism is its concept of learning. Learning is a process of making sense of the world around you and constructing knowledge, through the experiences you have, by relating your experience to what you already know, and through the guidance that teachers are able to offer you (von Glasersfeld 1995).

In the ICT-rich classroom, the provision of additional sources of knowledge and information reduces the dependency of pupils upon the teacher. The pupils are able to use the ICT at their disposal to control and pace their own learning, taking an active role, and constructing knowledge rather than taking the more passive role of receiving it. Their constructions of knowledge can then be assessed against those of other members of the class, including those the teacher had planned for. Having choices and making independent and/or collaboratively negotiated decisions are features of independent learning.

The table below lists some of the characteristics of constructivist learning and teaching. ICT-based projects, which make partial use of the Internet to provide students with rich learning environments, need to include some of these characteristics to enable pupils to develop the qualities of independent learning evident in the National Curriculum Programme of Study for ICT.

Characteristic	Teacher use	Pupil use	Not seen
Multiple perspectives			
Pupil-directed goals			
Teachers as coaches			
Metacognition			
Learner control			
Real-world activities and contexts			
Knowledge construction			
Sharing knowledge			
Reference to what pupils know already			
Problem solving			
Explicit thinking about errors and misconceptions			
Exploration			
Peer-group learning			
Alternative viewpoints offered			
Scaffolding			
Assessment for learning			
Primary sources of data			

Task 6

Teaching for independent learning

1 hour

Identify a teacher who is confident in their use of ICT as a medium for teaching and learning. They need not necessarily be from your subject specialism. Ask to observe them using ICT during a lesson.

Use the checklist above to identify the features of the lesson. How does the teacher provide opportunities for independent learning?

Look back to the diagram on page 5. In which segment of the diagram is the teacher operating?

Changing learning behaviours

Behaviourists claim that learning changes behaviour when learners respond to teaching by exhibiting similar responses to the same, or similar, teaching stimuli. In ICT this would be seen as the use of models of programmed learning, where pupils use software to redress deficiencies in basic skills (usually in literacy and numeracy) or the use of drill and practice approaches to teaching.

Keyboarding is a prime example of the drill and practice approach, where pupils spend time learning which fingers to use for which keys on the keyboard so that, eventually, they can type, using all their fingers appropriately, without looking at the keyboard. Some would argue that this makes working with the major input medium much more efficient and that the time spent going over basic skills until proficiency is gained establishes reinforcers that will serve us well in the future, rather like the notions that apply to 'riding a bike'.

This has often been referred to as 'operant conditioning' and can be seen as an important aspect of learning reinforcement. Behaviourism grew therefore from a belief that positive and negative reinforcement with punishment appropriately applied would, when arranged effectively, cause pupils to learn. The teachers' role in this was to organise the reinforcers and to develop appropriate directed teaching sessions to support the learners as they progressed.

Many of the skills-based approaches to teaching with ICT follow a behaviourist model, directing the learning step by step, prompting pupils with praise and passwords (positive reinforcement) when they have completed tasks effectively, or focusing on the requirement to follow instructions exactly and making keystrokes accurate when working in order to pass (negative reinforcement).

Drill software and drill approaches to teaching are underpinned by such techniques as *mastery learning* (Bloom 1986). Here pupils are encouraged to master basic skills before progressing to higher-order skills and competencies, while the teacher is required to present learning opportunities and activities that will enable pupils to demonstrate their knowledge, skills and understanding.

Teachers using ICT may find directed teaching specifically appropriate when they identify pupils who, perhaps for improved classroom management and a better learning environment for all, need to have a system of structured learning in place. They may also find it appropriate when certain prerequisite skills need to be in place before an element of active learning can best be established.

Task 7

Reviewing your teaching and learning

25 minutes

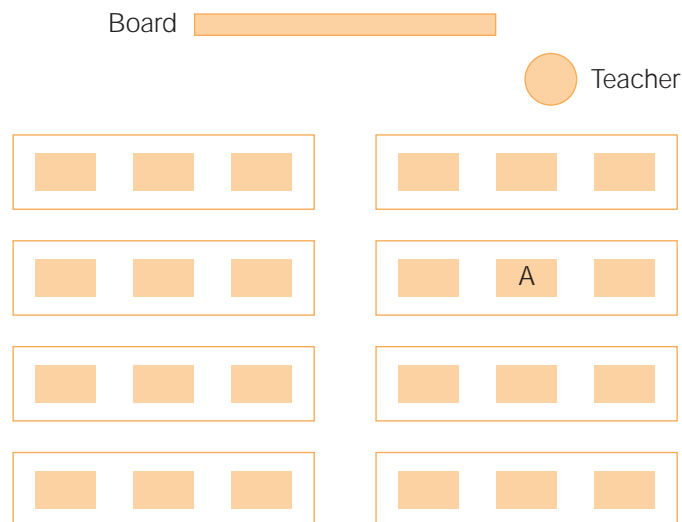
Read through the descriptions above, and through the [summary of research](#).

What claims are made about the use of ICT to enhance teaching and learning?

Look again at the diagram on page 5. Where do you see directed teaching fitting into the diagram?

4 Classroom organisation

Managing effective learning can be greatly influenced by the layout of the classroom in which you are teaching. If you are teaching in a computer room there is often nothing you can do about the layout of the room. Consider the classroom layout below:



There are problems with this layout. From the front of the classroom the teacher cannot see all the pupils, nor can the teacher see what the pupils are doing. It would be difficult to move behind each row of pupils. If the teacher needed to spend time with pupil **A** then the actions of the majority of the class would be unknown at worst, or difficult to monitor at best.

Constant movement around the classroom is important here. The pupils need to know that you are confident in a teaching environment like this. You also need to be confident that you can maintain a working atmosphere in a classroom that you may only use occasionally. It is also important to recognise that standing at the back of the classroom has an important psychological effect – when focused on their work pupils are less likely to know just where you are, and are consequently less likely to misbehave.

Task 8

Establishing your position

15 minutes

Look at the various rooms you are likely to be using for teaching. Look especially at the ICT rooms. In each room go to different points and try to establish:

- the focal point of the room;
- where pupils may have their backs to you;
- whether or not there is space for pupils to do some writing;
- health and safety issues – bags and coats;
- where you can move to easily;
- the blind spots that could occur if you give help to individual or groups of pupils.

Classroom organisation is not just about the layout of the room. Your perceived role as teacher will also have an impact. Consider the implications of the following teaching roles:

- learning facilitator;
- information giver;
- pupil manager.

These roles can take place within the same lesson, or separately. As with any lesson the principles of classroom organisation involve the establishment and maintenance of familiar rules and routines. You may, in lessons which do not involve ICT, determine that there should be no movement around the classroom unless permission is given. There should be no reason why that routine should change in an ICT room. Printouts, for example, are often one reason why pupils attempt to move around the ICT classroom, and when waiting for printouts are otherwise unoccupied. Establish clear routines for dealing with this – either by distributing printouts yourself, allocating the responsibility to a pupil or setting specific collection and transition times during lesson activity.

Transitions are another aspect to consider carefully. These occur at different points in the lesson: from starter activities to the main part of the lesson; from episode to episode within the lesson; and from main activity to the plenary.

The main barrier between you and the pupils when the pupils are using computers is the computer itself. The focus of attention will be the screen in front of the pupils. To gain attention you have to draw the pupils away from the focal point in front of them and the work they are doing, to you.

During a starter activity, or during a demonstration, it is advisable that monitors are turned off. This makes any intervention you want to make much more focused, and removes the temptation to talk over the class. Your instructions and demonstrations are much more likely to enable you to focus and direct work, and will enable you to make an effective transition from classroom activity to a plenary session.

These are important points to consider when using interactive whiteboards. Here the focus of the activity is on the demonstration, and on the opportunity that pupils have to interact with the demonstration, to be involved in the learning, and to demonstrate that they are learning. You need to consider how pupils will move from their seat to the front of the classroom, and back to their seat, causing the minimum of disruption. The focus is the work at the front of the classroom – not what is on the monitors before them. Again, routine is the order of the day.

Task 9

Looking at lesson transitions

15 minutes

Select a lesson from your scheme of work where you are planning to use ICT. Think about the nature of the starter and the main episodes.

Consider the class and the setting. Is it just one computer and data projector? Is it a computer room with limited space for off-computer working? Are you dealing with laptops or hand-held computers?

Plan how you will organise a transition from a demonstration starter activity to the beginning of a practical exercise and any further episodes.

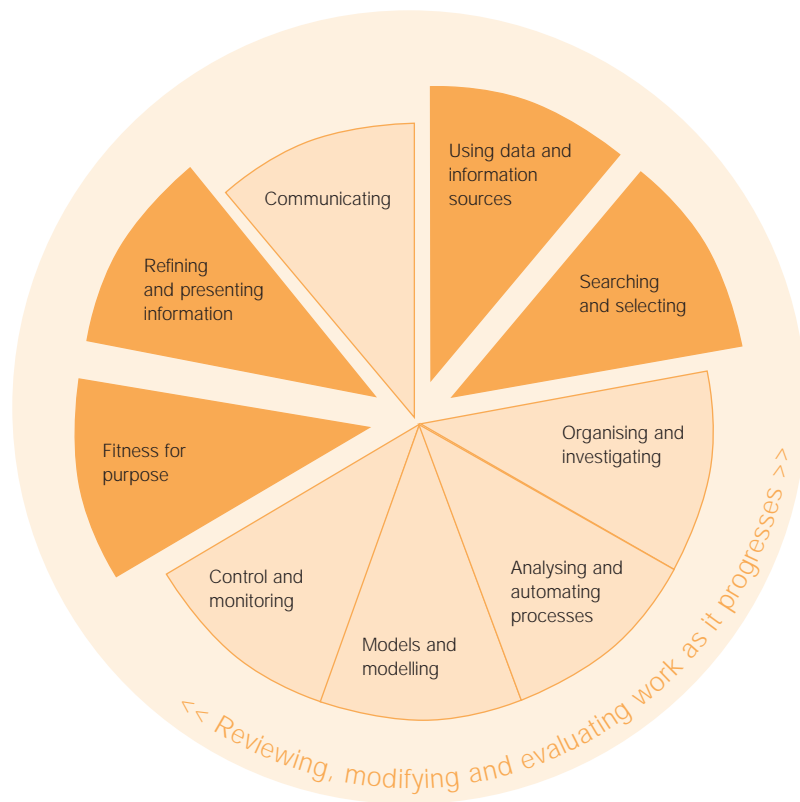
5 Using ICT to enhance subject teaching

An overview

The expectation is that pupils will have been taught in all nine key concepts of ICT capability in their ICT lessons. This provides the foundation for the application and further development of these ICT key concepts across the curriculum. The nine key concepts are shown in the diagram below.

Although all ICT key concepts could be applied and developed in most subjects, some are more significant than others. The four ICT key concepts, highlighted on the diagram below, that have been identified as being particularly significant for English are:

- using data and information sources;
- searching and selecting;
- fitness for purpose;
- refining and presenting information.



Establishing the fit between ICT and subject objectives

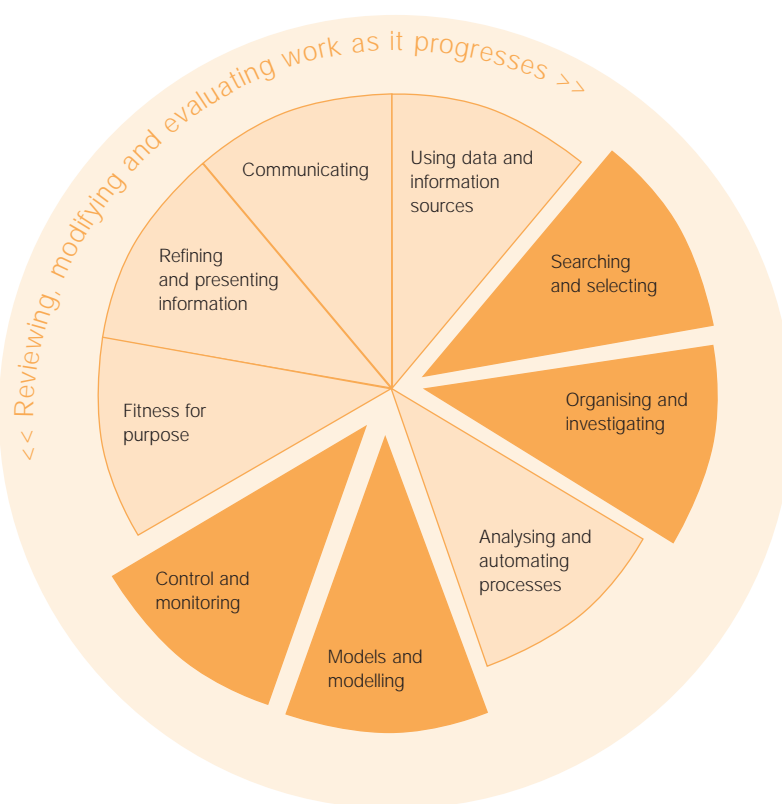
10 minutes

Looking at the four key concepts highlighted in the diagram above, it may strike you as strange that Communicating has not been extended beyond the pie. Communication is after all a key concept within English!

Look at the yearly teaching objectives for ICT in Years 7, 8 and 9 (pages 30–32) in the *Framework for teaching ICT capability*, Ref. DfES 0321/2002. Why do you think it is that Communicating in ICT has not been highlighted for development during English lessons?

For science, the four key concepts (highlighted in the diagram below) that are particularly significant are:

- searching and selecting;
- organising and investigating;
- models and modelling;
- control and monitoring.



Other key concepts could also be applied and developed in any subject. If this is done, the relationship between the key concept being developed, the yearly teaching objectives for ICT and the subject objectives must be carefully considered.

Diagrams such as those you have been looking at exist for each subject within the curriculum at Key Stage 3. Subject Associations highlighted the key concepts for ICT that could be developed and applied in subject lessons. They are published within the *ICT across the curriculum* pack, which can be ordered by every school Ref. DfES 0171-2004.

Talk to your school Strategy manager about the *ICT across the curriculum* materials.

Identify the elements of the pack that relate most closely to your subject.

Use your subject 'pie diagram' to find out more about the yearly teaching objectives for ICT, and talk to your ICT coordinator about the expectations you should have about pupils' capability in ICT and the impact it should have on the use of ICT in your lessons.

How can the use of ICT raise standards in other subjects?

ICT can be used as a tool to:

- support teachers to:
 - improve lesson design;
 - transform teaching and learning;
 - engage and motivate pupils to learn more effectively;
 - provide opportunities for pupils to learn in alternative and challenging ways, using a wide range of sources of information and techniques to support critical thinking;
 - support both individual and collaborative work;
- enable pupils to:
 - see patterns or behaviours more clearly;
 - add reliability or accuracy to their work;
 - engage in whole-class discussion regarding first-hand observations;
 - consider issues raised by their observations within a wide range of contexts;
 - draft and plan, manipulate their writing and access a wider variety of strategies to improve attainment;
 - review, refine, re-draft and modify work in progress;
 - refine and present their ideas more effectively and in different ways.

Planning and progression

Teachers should expect pupils in any given year to have covered all or most of the ICT Framework objectives from the previous year. Subject teachers may also wish pupils to apply ICT skills that they learn during the year in which they are being taught. It is important to liaise with the ICT department to ensure that the levels of expectation and challenge are appropriate to pupils' experiences and levels of ICT capability.

Using ICT effectively in your subject teaching

To ensure the effective use of ICT in your subject, you should:

- plan the use of ICT by pupils, in collaboration with the ICT department, to ensure that pupils have appropriate ICT skills;
- analyse how to build on prior learning in your subject and ICT to inform planning of schemes of work and design of lessons;
- be sure that appropriate ICT resources are available for the lesson.

It is important to plan for a range of uses of ICT, to ensure that pupils' capability is developed and consolidated as they progress, both in your subject and in the use of ICT. In particular, you should plan to use ICT in your lessons at a level that will have been covered in ICT lessons.

You will need to ensure that:

- pupils' use of ICT is varied but appropriate to their learning in your subject;
- as pupils' ICT capability increases they should be given further opportunities to apply and develop appropriate aspects of that capability in subject lessons.

It may be appropriate to use low-level ICT skills to enhance learning in your subject but pupils should also be given opportunities to apply higher-order skills. This should enable pupils to enhance their subject learning further, as well as to develop their ICT capability. Using higher-level ICT skills will also increase pupils' motivation by providing new opportunities for learning that could not be achieved easily in other ways.

Awareness of the capabilities of pupils' competence in ICT will enable you to plan lessons that use ICT to help challenge and motivate pupils of all attainment levels. It is expected that:

- Year 6 ICT capabilities will support Year 7 subject work;
- Year 7 ICT capabilities will support later Year 7 and Year 8 subject work;
- Year 8 ICT capabilities will support later Year 8 and Year 9 subject work;
- Year 9 ICT capabilities will support both later Year 9 subject work and Key Stage 4 work.

6 Using classroom support staff effectively

You may be working in a school that makes use of learning mentors or classroom assistants. Classroom support staff will largely be working with specific groups of pupils in your classroom. Some may be targeting students with specific learning difficulties; some may be working with pupils who need literacy and numeracy development; while others will be working with pupils identified as 'gifted and talented'.

The identification of pupils who need support in your lessons will involve a number of parties. If your classroom includes pupils who require learning support, you will need to identify how you can best plan for their full inclusion. A first step would be to identify the learning outcomes that these pupils can demonstrate as a consequence of teaching. A second would be to discuss the supporting role the classroom support staff will take. You will also need to check what the classroom support staff will need to know in order to be able to work with the pupils who have been targeted.

Discuss the three questions below with your peers and with your coach or mentor.

- What effect can classroom support staff have in an ICT-rich classroom environment?
- Does their knowledge of what you are doing have any bearing on your planning and preparation?
- Should you include them in your lesson planning?

Draw up a set of operational questions that you need to explore with classroom support staff.

Discuss the results with your peers and with your coach or mentor. Amend your planning list as necessary.

7 Building capacity in school

Schools put considerable investment into ICT resources. However, this investment alone will not necessarily give pupils appropriate opportunities to 'apply and develop' ICT capability – nor automatically add value to teaching and learning. Effective implementation of ICT across the curriculum is much more complex and involves strategic management and coordination within whole-school policies. An effective model of applying and developing ICT across the curriculum depends on a number of factors, including:

- effective teaching of the National Curriculum programme of study for ICT (the subject);
- appropriate opportunities for pupils to apply and develop ICT capability in a range of subjects and contexts (transferable knowledge, skills and understanding);
- deployment of resources so that subject areas can access ICT when it is needed, including provision of ICT within subject classrooms or areas;
- a policy for purchasing of resources that maximises their use and allows for provision, laptops and wireless networking capability;
- appropriate subject-specific resources in all departments, that are selected on the basis of fulfilling subject learning objectives;
- planned use of ICT in schemes of work for all subjects, so that resources can be appropriately deployed and organised;
- whole-school policies which clearly map and sequence opportunities for application and development of ICT, so that pupils bring the appropriate ICT capability to subject lessons;
- whole-staff awareness of ICT capability and what can reasonably be expected of flexibility of use, for example whole-class teaching, small-group work, individual teacher use – this could include consideration of whole-school networking of pupils in each year.

Planning and sequencing ICT across the curriculum

Subject teachers need to know what they can reasonably expect a pupil to know, understand and be able to do at each point in Key Stage 3.

Schools will need to map and sequence the teaching of ICT capability. This will identify when subject teachers can reasonably expect to develop and apply pupils' ICT capability and move teaching and learning forward in their own subject. For example, once pupils have been taught appropriate search techniques on the Internet, including consideration of validity and bias, they can be expected to undertake purposeful research in other subjects and present their findings.

Establishing expectations

It is also important to consider the experiences of pupils at Key Stage 2. Again, individual schools will differ but the extract below (taken from the *Framework for teaching ICT capability: Years 7, 8 and 9*) describes what most pupils should have learned in ICT by the end of Key Stage 2. This summary is based largely on pupils following the Key Stage 2 QCA scheme of work, or equivalent, during Years 5 and 6.

Finding things out

By the end of Year 6, most pupils should be able to:

- identify the information they need to complete a simple task or solve a simple problem;
- use simple search techniques, including indexes and lists of contents, to find information;
- prepare information for use in a task by downloading relevant pieces or collecting them from various sources;
- classify information for use in a database and understand how a suitable structure is created;
- recognise different types of information such as text, numbers, graphics;
- enter data into a database, search it and present data in simple tables and graphs;
- check that information is accurate and reasonable;
- discuss what might happen if information is entered into the computer incorrectly or not downloaded completely.

Task 13

Establishing expectations of pupil capability

20 minutes

There are expectations at the end of Key Stage 2 for each of the ICT key concepts. They establish a baseline for your expectations of pupil capability as they enter your classroom in Year 7.

Read through the expectations for the end of Key Stage 2 outlined in the *Framework for teaching ICT capability: Years 7, 8 and 9*, which can be found at www.standards.dfes.gov.uk/keystage3/respub/ictframework/ictfwkdl

Discuss with your peers and with your coach or mentor the impact these expectations of capability will have on your planned use of ICT in your subject.

8 Continuing to develop your professional capability

Key questions

- How is use of ICT currently enhancing teaching and learning in your subject?
- What further opportunities can be exploited?
- What is inhibiting further use of ICT?
- What are the next steps in moving the department forward?

This section is intended to support your thinking when working with your colleagues to move ICT across the curriculum forward. It offers suggestions for some next steps for you and your department, broadly based around:

- the use of ICT in your department;
- reviewing your current position;
- applying and developing ICT capability from the ICT National Curriculum.

Below are some prompts and suggestions for thinking about your existing provision, understanding how ICT is taught in your school and identifying potential new opportunities for teaching and learning in your subject.

How is ICT being used in your department?

Identify ways in which ICT is currently used in your lessons to add value to teaching and learning.

- What good practice in using ICT currently exists in your department and how does it enhance teaching and learning?
- For each of these areas, is ICT being used by pupils, by teachers or by both?
- Are all teachers in your department using ICT in lessons in the same way or are individual teachers just using their own ideas?
- How can these ideas be shared with other teachers in the department?

Reviewing your current position

You could consider:

- identifying where pupils use ICT in their lessons and how it impacts on teaching and learning in your subject;
- allocating time at departmental meetings to share existing good practice and to look at ways in which it could be incorporated or adapted into schemes of work for all teachers in the department;
- setting up peer observation or paired teaching with colleagues to observe each other and assess the value that ICT is adding to the lesson – you may find the Key Stage 3 guidance on coaching (included in *Sustaining improvement: a suite of modules on coaching, running networks and building capacity* Ref. DfES 0565-2003) a useful tool to help you with this.

Applying and developing ICT capability

Identify where your current scheme of work gives pupils opportunities to apply and develop their ICT capability at a level appropriate to their experience.

- Are you fully aware of the breadth of ICT capability that pupils are taught in ICT?
- Which parts of the ICT National Curriculum are particularly significant for your subject and give pupils potential opportunities to apply and develop their ICT capability?
- Are there implications for your training?
- Does the scheduling of your subject scheme of work and the ICT scheme of work provide a coherent way forward for pupils' use of ICT?

You could consider:

- talking to the ICT subject leader about the breadth of ICT capability that pupils are taught in the ICT National Curriculum;
- identifying areas for your development, with your subject leader and your coach or mentor, and working with the ICT subject leader and the LEA to establish sources of support;
- discussing with the ICT subject leader possible changes to the schedule of the schemes of work to ensure that, in subject lessons, pupils are building on ICT that has already been taught;
- working with the school's ICT coordinator to identify how your department contributes to the whole-school policy of ICT across the curriculum;
- discussing with other teachers in the school how they give pupils opportunities to apply and develop ICT capability in their respective subjects.

Summary of research

Effective use of ICT in other subjects often builds on discrete ICT lessons by providing fresh contexts for applying newly learned skills and understanding. This example of a lesson with a higher-attaining English set is described in *ICT in schools*, published by Ofsted in April 2002, and available from the Ofsted website:

www.ofsted.gov.uk/publications/index.cfm

Example

The pupils were working on a genre study of horror fiction. In the previous lesson they had begun to write text and sketch design ideas for a horror fiction website home page. They had started learning about web-page design in their ICT lessons and in the previous English unit. They were now working in the ICT suite, designing their home page with hypertext links to other pages. They referred to a worksheet, which contained clear instructions for setting up hypertext links. The teacher stressed primacy of purpose and audience rather than design for its own sake. Pupils worked quickly and effectively in pairs, constructing their home pages and incorporating images and text from the Internet as required. Motivation

was very high and the task forced pupils to summarise in a very accessible form what they had learned about the horror genre, which they did very well.

There is a statutory requirement to use ICT to support pupils' learning in every Key Stage 3 subject. The main purpose of using ICT in a lesson in another subject may be to develop pupils' skills and understanding in that subject. If so, the ICT objectives may be at a relatively low level (although they may provide some useful practice). On the other hand, the main purpose of the use of ICT in another subject may be to enhance pupils' ICT capability in a different context. In this case, the subsidiary objectives for the other subject must be challenging enough to meet pupils' needs in that subject without distracting from the ICT objectives.

ICT resources are not a panacea for all eventualities. In some situations they will be the best way to convey or consolidate a new concept, but not always. ICT needs to be planned carefully into departmental schemes of work so that pupils make good progress. Teachers can check whether the use of ICT is appropriate by asking whether it will:

- allow pupils to investigate or be creative in ways not possible otherwise;
- give them access to information not otherwise readily available;
- engage them in the selection and interpretation of information;
- help them to think through and understand important ideas;
- enable them to see patterns or behaviours more clearly;
- add reliability or accuracy to measurements;
- enhance the quality of their presentations;
- save time, for example spent on measuring, recording or writing.

Teachers' knowledge

Passey (1998) identifies a need for teachers to begin to see ICT in the same way that their pupils do, and, in coming to see the technology as part of their natural teaching and learning repertoire, they will support their own development of a pedagogic competence in ICT (Loveless et al. 2001; Barker and Franklin 1998).

The argument is that teachers who are confident in their teaching and learning styles, and who are clear about the 'whats', 'hows' and 'whys' of teaching and learning, should find that the incorporation of ICT knowledge and skills should enhance their overall capability.

The view that teachers who can 'teach' enhance their capability by taking ICT on board is perhaps challenged by views about the quality of teaching and learning using ICT across the curriculum (see the Ofsted quote on page 2).

Passey's views are more important for those teachers of *ICT across the curriculum* who need to utilise ICT in the teaching of their own subject, and who need to develop confidence in applying the tools and so enrich the pedagogic competency they already have. The significance for teachers of ICT is that they develop pedagogic competency in the teaching of ICT, in a framework of secure subject knowledge, and the confidence to apply their functional competency in contexts which encourage and enhance rich learning opportunities for their pupils.

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Next steps

This unit has explored an aspect of teaching and learning. You may wish to develop your ideas further, to consolidate, apply ideas in different contexts or explore an aspect in more depth and innovate.

Reflect

What have been the key learning points for you?

What has been the impact on pupils?

Here are some suggestions as to how you may develop practice further:

- consider undertaking some action research based on your evaluations of the impact of your changed practice using ICT;
- review and revise the scheme of work for an examination group who could benefit from using ICT to enhance their learning;
- contact the school Strategy manager and ask for your subject guidance from the *ICT across the curriculum* pack, Ref. DfES 0171-2004. Read through the suggested approaches and implement the ideas. What areas have greatest impact in the classroom and why?

Setting future targets

Having considered your next steps, you may wish to set yourself some personal targets to support your own continuing professional development. You could use these ideas to inform your performance management discussion.

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Task 14

Setting your targets

40 minutes

When setting targets for the future you may want to discuss the possibilities with a colleague or your line manager.

Whatever you decide to do, you will need to consider the following.

- What are your objectives for the next year?
- What are the expected outcomes in terms of pupils' achievements?
- What strategies will you employ to achieve these outcomes?
- How will you track progress over the year?
- How will you know whether you have been successful or not?

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Ref: DfES 0438-2004 G

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